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ABSTRACT

An experiement was conducted to test the hypothesis that interest inventory items would function as reinforcing stimuli in a visual discrimination task. When previously rated liked and disliked items from the Strong Vocational Interest Blank were differentially presented following one of two responses, subjects learned to respond to the stimulus that was followed by liked items. When indifferent items were presented following responses to one stimulus, the delivery of either liked or disliked items after responses to the other stimulus produced no systematic changes in discrimination performance. The results support the A-R-D interpretation that attitudinal stimuli (interest items) which elicit emotional responses will also serve as reinforcing stimuli when made contingent upon instrumental responses. A-R-D is a label chosn to designate the attitudinal, reinforcing, and discriminative functions of stimuli. (Author/MF)

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DEPARTMENT OF PSYCHOLOGY
UNIVERSITY OF HAWAII

HONOLULU, HAWAII 96822

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Arthur W. Staats, Carl G. Carlson, and Ian E. Reid

Technical Report Number 7

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PRINCIPAL INVESTIGATOR:
ARTHUR W. STAATS

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## ABSTRACT

An experiment was conducted to test the hypothesis that interest inventory items would function as reinforcing stimuli in a visual discrimination task. When previously rated liked and disliked items from the Strong Vocational Interest Blank were differentially presented following one of two responses, subjects learned to respond to the stimulus that was followed by liked items. When indifferent items were presented following responses to one stimulus, the delivery of either liked or disliked items after responses to the other stimulus produced no systematic changes in discrimination performance. The results support the A-R-D interpretation that attitudinal stimuli (interest items) which elicit emotional responses will also serve as reinforcing stimuli when made contingent upon instrumental responses.

# INTEREST INVENTORY ITEMS AS REINFORCING STIMULI: A TEST OF THE A-R-D THEORY

Arthur W. Staats, Carl G. Carlson, and Ian E. Reid

University of Hawaii

The present study continues a theoretical-experimental development of the first author's begun in the early 1950's. The development began with his extension of classical and instrumental conditioning principles to analysis of functional human behavioral repertoires (see Staats, 1968a, 1970, in press). One of the aspects of this study involved the manner in which emotional responses come to be elicited by new stimuli--especially verbal stimuli. The basic principles were first tested with animals in experimental-naturalistic studies with single subjects.

The findings and theory were then extended to humans in an extended series of studies in the first author's research project on a learning theory of language and communication which began in 1955 (and which was under Office of Naval Research support from the next year through 1964). It was shown that emotional responses could be conditioned in first-order classical conditioning (Staats, Staats, & Crawford, 1958). This study was replicated by Maltzman, Raskin, Gould, and Johnson (1965), as well as by Zanna, Kiesler, and Pilkonis (1970), who provided controls for possible demand characteristic interpretations. It was also shown that higher-order classical conditioning of such responses could occur (Staats & Staats, 1957; Staats, Staats, & Heard, 1960). Other studies have supported these findings (Abell, 1969; Franks & Mantell, 1966; Gerstein, 1961; Miller, 1966a, 1966b, 1967; Pollio, 1963).

Staats has also proposed that attitude formation involves the same principles as verified in the above studies. His verbal classical conditioning procedures were thus extended to test the possibility that attitudes can be classically conditioned. The study showed that national names came to elicit positive or negative attitudes if systematically paired with words that elicited either positive or

negative emotional responses (Staats & Staats, 1958). It has also been shown that the names of people that elicit attitude responses in the subjects may be used to condition the attitude response to new neutral stimuli (Blandford & Sampson, 1964). Picture stimuli that elicit emotional responses will also produce attitudinal conditioning--and this can be measured physiologically (Geer, 1968).

The first author has continued the theoretical development of the learning theory of attitudes by suggesting that when a stimulus comes to be a CS for an emotional response in classical conditioning it will thereby also serve as a reinforcing stimulus (Staats, 1963, 1964a, 1964b, 1964c, 1967a, 1967b, 1968a). This principle has been experimentally tested in a study by Finley and Staats (see Staats, 1964a, pp. 210-211; Finley & Staats, 1967).

Golightly and Byrne (1964) have also employed the principle that attitude stimuli should serve as reinforcing stimuli. They completed a study employing attitude statements that were similar to the attitudes of the subject as the reinforcing stimuli. Byrne and Clore (1969) have also gone on to elaborate the attitude theory in terms of the classical conditioning principles described above. Eisman (1955) had also suggested in a complex Hullian analysis that attitudes could serve as mediating responses, following Doob's (1947) suggestion. Lott and Lott (1960) showed that when children were rewarded in the presence of others the others came to elicit positive attitudes--and again discussed the findings in terms of fractional anticipatory goal responses. More recently Lott and Lott (1968, 1969) have begun to investigate the reinforcing properties of attitude stimuli.

Staats (1968b) has recently elaborated and further systematized his theory of attitudes on the basis of an improved learning theory, and has extended the attitude theory to various areas. In this analysis a number of experimental hypotheses were derived from the theory. Five main areas of research were dealt with: (1) basic research in the theory; (2) social interaction; (3) personality and personality assessment; (4) applied attitude change in behavior modification

and behavior therapy; and (5) sociological and anthropological cross-cultural research. One of the main points of the attitude theory, also indicated in the earlier works, was that stimuli which elicited attitude responses and were thereby reinforcing stimuli, would also have a third characteristic. The stimuli would elicit or control a variety of instrumental behaviors--approach behaviors if the attitude stimulus was positive and avoidance behaviors if the attitude stimulus was negative. The theory was called A-R-D theory to label the attitudinal function (eliciting emotional responses), the reinforcing function, and the discriminative (controlling) function of such stimuli. It was indicated that attitude stimuli, because of these three functions, constitute primary conditions that define the area of human motivation. It was indicated that the nature of the individual's (or group's) A-R-D system is important in a wide number of areas of study of human behavior--attitude formation and function, imitation, language and communication, leadership, interpersonal attraction, group cohesiveness, values, word meaning, behavior pathology such as phobias, and so on.

One of the areas of extension of the A-R-D theory was to the area of personality measurement. It was suggested that test items involving human motivation were actually stimuli that had A-R-D properties.

Research in this area should be conducted to test the theory that such items on tests do indeed measure conditioned stimulus value and reinforcing stimulus value, as well as discriminative stimulus value. Thus, for example, one experimental hypothesis would be that people who indicate on an inventory positive attitudes (or interests, needs, and so on) for certain stimulus objects, events, or activities should be reinforced more strongly by those stimuli or their verbal (counterparts) in an instrumental conditioning situation (such as that used by Finley & Staats, 1967). In addition, the words on such a test (or the actual

stimuli) should also serve better in a classical conditioning situation such as has been described herein. Thus, a person who tested as having positive attitudes toward sports and sports figures should be classically conditioned to positive attitudes toward a stimulus which is paired with words labeling sports events and the names of prominent sportsmen, whereas a person with negative attitudes toward the same stimuli would be conditioned in a negative direction from the same experience. This type of research would relate the field of psychological measurement to the basic field of psychology (Staats, 1968b, p. 59).

It has already been shown by Gross and Staats (1969) that interest inventory items can be employed as stimuli that elicit emotional responses. That is, when items the individual indicates positive interest for are paired with a neutral stimulus the stimulus comes to elicit positive emotional responses. On the other hand, items scored in the negative direction can be employed to classically condition a negative emotional response in the subject. The present study is to further test the A-R-D theory in the context of personality measurement. That is, the second hypothesis stated is that interest inventory items will have reinforcing properties. Such items should be capable of strengthening or weakening instrumental responses on which they are contingently presented. Again, in the present study the items employed as reinforcers were taken from the Strong Vocational Interest Blank, administered under standard conditions.

## METHOD

### Subjects

A total of 111 female students drawn from the introductory psychology and educational psychology courses at the University of Hawaii were administered the

Strong Vocational Interest Blank (SVIB) for Women (Revised, form W). Only subjects who had marked at least 50 items in each of the three rating categories of Like, Indifferent, and Dislike out of the total of 294 items that are scored on this three-point scale (i.e., items 1-255, 362-400) were selected for placement into the three experimental conditions. The 69 Ss who met this criterion were equally distributed among the six experimental groups by random assignment, with 3 Ss being discarded to preserve equal sample sizes.

Experimental Conditions

The experimental groups were formed on the basis of which type (or category) of interest item would be contingent on each of the two possible responses available on each trial of a visual discrimination task (described below). Thus, with three types of interest item (liked, indifferent, and disliked), there were three basic experimental conditions: (1) LIKE-DISLIKE (LD), in which a response to stimulus figure 1 was followed by the presentation of an interest item S had previously rated as "liked", and a response to stimulus figure 2 was followed by a "disliked" interest item; (2) INDIFFERENT-LIKE (IL), in which stimulus 1 responses produced "indifferent" items and stimulus 2 responses produced "liked" items; and (3) INDIFFERENT-DISLIKE (ID), in which stimulus 1 responses produced "indifferent" items and stimulus 2 responses produced "disliked" items.

Selection of Reinforcing Stimuli

Two sets of items were prepared for each S. Each set consisted solely of items from the SVIB which that particular S had rated in a specific preference category (i.e., Like, Indifferent, or Dislike). Within each 96-item set, the items were arranged in a random order. If a subject did not have 96 different items in one category, all items in that rating category for that S were set into a random order, this order being repeated until a total of 96 items was generated. A computer program was developed to perform the selection and ordering of items, and yielded an output for each S of 2 sets of 96 cards (Globe No. 1, Standard Form

5081) each.[1] Each card had the particular interest item printed in the upper left-hand corner of the card, and the letters "L," "I," and "D" printed in the upper right-hand corner.

Procedure

The experimental task was a relatively simple visual discrimination task initially described by Golightly and Byrne (1964). The subject was seated in front of a black wooden panel. In the center of the panel was a window in which stimulus cards were presented. Each stimulus card consisted of two figures which varied in size (large and small), color (black and gray), shape (circle and square), and position (left and right). For the 96 trials of the experiment the eight possible combinations of stimulus figures on the cards were arranged in independent random orders within each block of 8 trials.

At the start of the experiment S was seated in front of the panel and told that he was serving in a learning experiment. He was further told to choose one of the two figures each time a stimulus card appeared and to say his choice aloud. After each choice a vocational interest item from one of the two decks prepared for each S was presented through a small slot below the window. The type of interest item delivered to S on any particular trial was determined by the size of the figure chosen by S on that trial. Each group was counterbalanced for the stimulus size correlated with a particular type of interest item. Thus, for example, in the LD group half the Ss received a liked item following a choice of the larger stimulus and a disliked item following a choice of the smaller stimulus, while for the other half of the Ss in the LD group choices of the larger stimulus produced disliked items and choices of the smaller figure produced liked items. The same method of counterbalancing was used in the ID and IL groups. S was directed to read the item on the card and then rate it in the same manner as he rated the items on the SVIB he previously completed by circling the "L," "I," or "D" on the IBM card. The number of responses followed by liked items was scored

in blocks of 16 trials for LD Ss, while the number of responses followed by indifferent items was recorded in 16-trial blocks for ID and IL Ss.

## RESULTS

A total of 18 Ss served in the LD conditions, with complete counterbalancing for stimulus size correlated with type of interest item. Their performance is illustrated in Figure 1. An analysis of variance of these data revealed a

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Insert Fig. 1 about here
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significant trials effect ($F=2.60$; $df=5,85$; $p < .05$), and a subsequent trend analysis indicated this effect to be a linear function ($F=10.75$; $df=1,85$; $p < .05$). These analyses are summarized in Table 1. Regardless of the size of the stimulus cor-

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related with the delivery of each type of interest item, Ss showed a consistent increase in the number of responses to the stimulus that was followed by liked items.

Due to the failure of several Ss to serve in the experiment, an unequal number of Ss served in the subgroups of the IL and ID experimental conditions; 20 Ss appeared in the ID condition, equally divided between the two subgroups that were based on the size of the stimulus correlated with indifferent items; while 9 Ss served in the IL condition in which responses to the smaller stimulus figure were followed by indifferent items, and 7 Ss served in the IL condition in which responses to the larger stimulus were followed by indifferent items. A 2 x 2 x 6 analysis of variance (three-factor design with repeated measures on one factor, unequal group sizes) was conducted and the results are summarized in Table 2. These analyses indicate no main effects due to size of stimulus correlated

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Table 1

Analysis of Variance Summary Table for LD Data

| Source | df | MS |
|---|---|---|
| Between | 17 | 46.83 |
| Within | | |
| Blocks | 5 | 15.04 |
| Linear Trend | 1 | 62.22 |
| Quadratic Trend | 1 | 3.24 |
| Error | 85 | 5.79 |

Table 2

Analysis of Variance Summary Table for IL and ID Data

| Source | df | MS |
|---|---|---|
| Between | | |
| A (Stimulus size) | 1 | 16.83 |
| B (Type of item) | 1 | 8.02 |
| AB | 1 | 392.31 |
| Sub. w. groups | 32 | 19.04 |
| Within | | |
| C (Trials) | 5 | 8.51 |
| AC | 5 | 1.80 |
| BC | 5 | 5.89 |
| ABC | 5 | 3.10 |
| C x Sub. w. groups | 160 | 4.86 |

with indifferent items, types of interest items delivered, or trials. There is, however, a significant interaction between the size of the stimulus correlated with the delivery of indifferent items and the types of interest item that were delivered ($F=20.61$; $df=1,32$; $p<.01$). When responses to the larger stimulus were followed by indifferent items, Ss whose alternative response produced disliked items chose the larger stimulus more often than Ss for whom the other response produced liked items. These results are in agreement with the expectation that liked items will function as positive reinforcing stimuli and disliked items will act as aversive stimuli. When the smaller stimulus was followed by indifferent items, however, Ss chose the smaller stimulus more often when their alternate response produced liked items than Ss for whom the alternate response produced disliked items. There is no obvious explanation for this interaction, and its importance would seem to be reduced by the absence of any interaction terms involving a trials effect.

In summary, when liked and disliked items are differentially presented following responses in a two-choice discrimination task, Ss learn to respond to the stimulus that is followed by liked items. When indifferent items are presented following responses to one stimulus, the delivery of either liked or disliked interest items after responses to the other stimulus produces no systematic changes in performance on the discrimination task.

## DISCUSSION

The results indicate that positive and negative interest items when presented contingent upon responses affect the strength of the responses in a manner expected on the basis of the principle of reinforcement. This finding is supported by a study that has been published since the completion of the present experiment. That is, Reitz and McDougall (1969) conducted an experiment to test the same principle from the A-R-D theory. Reitz and McDougall employed the same experimental task; however, they did not have the subjects rate the interest item during

the conditioning task itself. Furthermore, they did not employ the standard conditions of the SVIB to select the interest items. That is, one of the hypotheses of the A-R-D theory (Staats, 1968b) was that the intensity of the rating should be correlated with the intensity of reinforcing value of the stimulus rated. Following this rationale, Reitz and McDougall had the SVIB interest items rated on Likert nine-point scales. Different groups of subjects were then given items rated for extreme like (ratings of 1 or 2) and extreme dislike (ratings of 8 or 9), or for moderate like (ratings of 3 or 4) and dislike (ratings of 6 or 7).

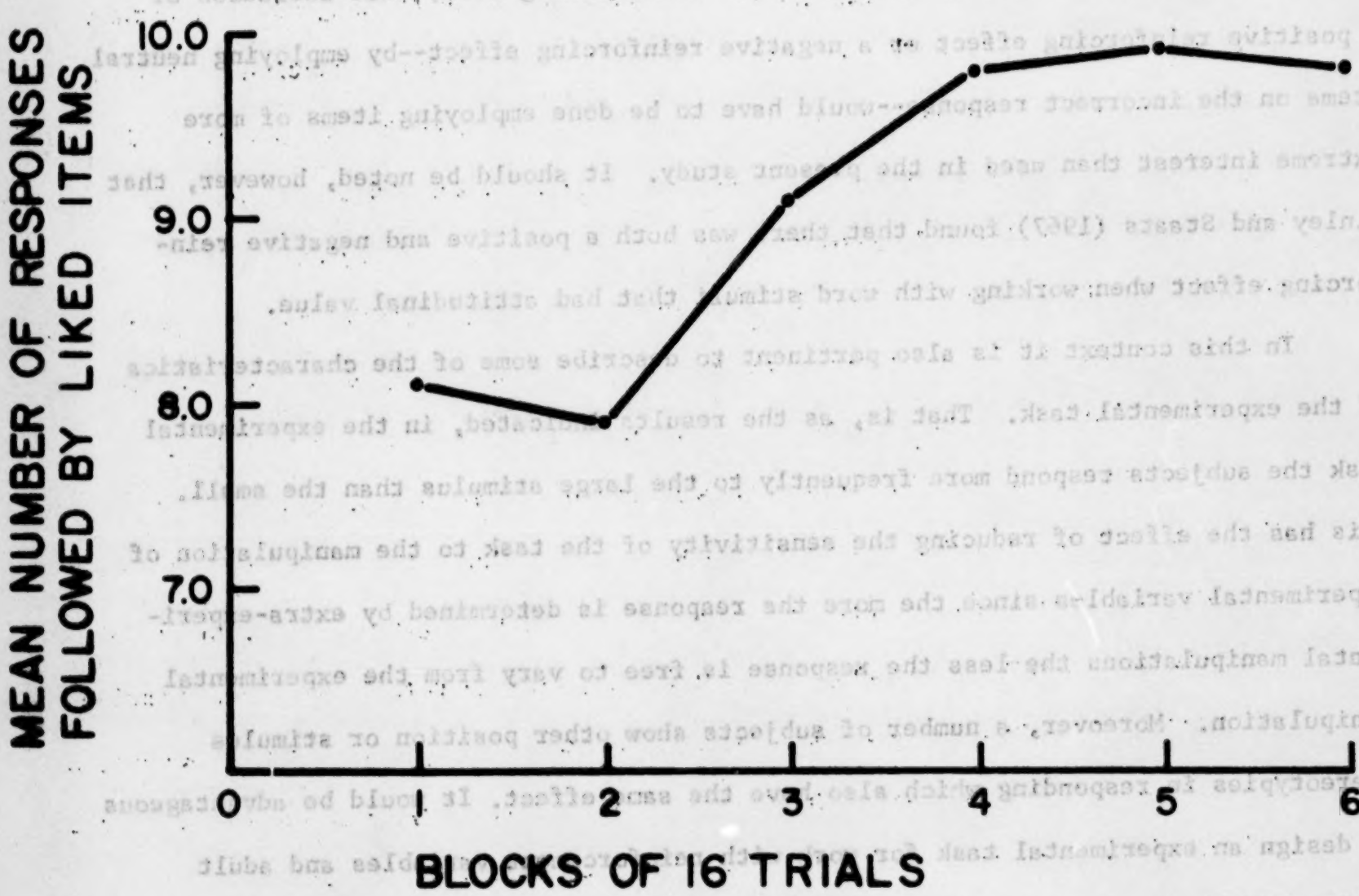
It is interesting to note that the results agree very closely with the present findings. That is, when the extreme items were employed as reinforcers there was clear (significant) evidence of conditioning. However, the effect was not shown with the items for which the subjects felt only moderate interest. The reinforcing value of the items of slight interest was not strong enough to be detected in the type of experimental procedures employed.

In the present study the interest items were responded to by the subjects in the standard SVIB procedure. This means in actuality that a three-point scale was employed--all the responses available were like, indifferent, and dislike. This means that the like items ranged from slight to extreme interest. The indifferent items ranged, probably, from neutral to slightly positive or negative; and the dislike items ranged from slightly negative to extreme negative. This means that the general reinforcement value of the positive or negative interest items was not high. Evidence that this is the case was shown in the Gross and Staats study (1969) in which it was shown that 27% of the items rated like on the first administration were rated either indifferent or dislike at the time of conditioning. On the other hand, 41% of the items first rated as dislike changed at the time of conditioning to one of the other categories; and 58% of neutral items changed either in the positive or negative direction. This suggests that many of the items in the three categories were not strongly positive, neutral, or negative.

The results appear to reflect this circumstance. That is, the conditioning occurred when the like and dislike items were employed to strengthen one response and weaken the other. However, when the like or dislike group of items was employed in opposition to the neutral items evidence of conditioning did not attain significance--although the difference were in the correct direction. It would appear, at least when employing the present conditioning task, that isolation of a positive reinforcing effect or a negative reinforcing effect--by employing neutral items on the incorrect response--would have to be done employing items of more extreme interest than used in the present study. It should be noted, however, that Finley and Staats (1967) found that there was both a positive and negative reinforcing effect when working with word stimuli that had attitudinal value.

In this context it is also pertinent to describe some of the characteristics of the experimental task. That is, as the results indicated, in the experimental task the subjects respond more frequently to the large stimulus than the small. This has the effect of reducing the sensitivity of the task to the manipulation of experimental variables since the more the response is determined by extra-experimental manipulations the less the response is free to vary from the experimental manipulation. Moreover, a number of subjects show other position or stimulus stereotypies in responding which also have the same effect. It would be advantageous to design an experimental task for work with reinforcement variables and adult subjects that did not have these drawbacks.

At any rate, the results of the present study, supported by the findings of Reitz and McDougall (1969), in conjunction with the earlier study by Gross and Staats (1969), begin to provide a psychological theory for an important area of personality. That is, specifically, the results suggest that learning principles are the basis for both the development and function of interests. The study of Gross and Staats (1969) showed that interest inventory items can function as stimuli that elicit emotional responses that can be conditioned to other stimuli. In


MEAN NUMBER OF RESPONSES FOLLOWED BY LIKED ITEMS
10.0
9.0
8.0
7.0
0
1
2
3
4
5
6
BLOCKS OF 16 TRIALS

drawing interests into classical conditioning theory, moreover, the experimental findings suggest that the principles of classical conditioning are involved in the original learning of interests. The interest items themselves must be considered to be learned--actually, conditioned stimuli for emotional responses. The suggestion is, thus, that the individual comes to have positive or negative interests for events, people, activities, occupations, and so on as a consequence of his emotional learning, according to the principles of classical conditioning. A good deal of this conditioning could take place upon a language level as well as in first-order conditioning. That is, by pairing positive attitude (or meaning) words with the events, people, activities, and so on, the latter would come to elicit positive attitudinal responses.

In sum, as a result of this primary and verbal conditioning experience each individual would be expected to acquire a unique constellation of "interests." It would be expected that the verbal labels for the events, people, activities, and so on, would elicit emotional (interest) responses like the actual stimuli--according to principles of learning already stated in detail (see Staats, 1968b). An inventory such as the SVIB samples the events that have learned emotional value for the individual. The individual is then described as being similar in his A-R-D system (reinforcer, or interest, system) to peopld in different occupations.

The present study, in addition, begins to indicate an important function of interests, and individual differences in interests. That is, in the present study it was shown that interest stimuli could function to produce new learning. The interest items had reinforcement value, and behavior upon which the items were contingent would increase in strength. It may be suggested that this is one of the reasons why interests and their measurement are so important--because through their reinforcement properties they help determine the behavior the individual will display. In describing this process a hypothetical example may be used. Say two individuals have the same behavioral skills but different interests. For

one of the two, interacting with people in a persuasive role elicits a positive emotional response (interest) as does the successful accomplishment of a persuasive act. Because of this the individual would score relevant interest items as <u>like</u>. For the other of the two individuals these events elicit negative emotional responses. This individual would score relevant interest items as <u>dislike</u>. Rather, quiet, scholarly solitary pursuits have more interest value for the latter individual, as does the result of such activity--the gaining of scholarly information. When placed in the same activities, one would expect on the basis of the learning theory of interests to see different behaviors develop in the two individuals. Placed in a sales position, the first individual would have his behavior reinforced. He would participate with good strength and would acquire the new behaviors involved in this participation. The other individual would not. On the other hand, when placed in a position involving solitary scholarly pursuits the second individual's behavior would be reinforced. He would participate strongly and learn the new behaviors involved.

In the A-R-D theory already described (Staats, 1968<u>b</u>, 1970) it has been suggested that a primary determinant of human behavior lies in individual differences in the various objects and events (social and physical) that have come to have emotional and reinforcing properties. It may also be suggested that the realm of interests deals with some of these individual differences and that interest inventories may be considered to be tabulations of the events that elicit emotional responses (attitudes or interests) in the individual and have as a consequence the power to reinforce the individual.

The learning analysis thus provides a theoretical rationale for interest tests (and other tests of human motivation such as test of attitudes and values). That is, the fact that an individual's interest (A-R-D) system is like that of people in a particular occupational group has conceptual and practical significance as a determinant of the individual's behavior. Faced with the same circumstances

as the people in the occupational group, his behavior should be similarly affected by the motivational stimuli provided by the circumstances--and motivational variables appear to determine a significant portion of human behavior. The learning analysis, supported by the experimental results so far, appears to provide a basis for understanding the relevance of verbal motivational tests, as well as the reasons that interest inventories provide predictions of occupational success.

This is not to say that the way the individual responds to the test item will be precisely the same as he would respond to the actual stimulus. The individual's response to the item may also be a function of other controlling events in the testing situation. However, in principle, the present formulation begins to establish a theoretical basis for the concept of interests as part of the study of the human motivational system.

It may be added that this work has other unifying themes. For example, it may be noted that the findings with the interest items duplicate other findings with words with evaluative meaning and attitude stimuli. This should be expanded to begin to deal with values, needs, and other concepts in personality theory. Only in this way will the present theoretical atomization of the field be overcome and unified theory established. Related to this is the function of the present studies in bringing the applied field of personality testing into conjunction with the theory and research methods of the basic psychology of learning. Additional work on the third function (the discriminative or controlling function) of interest inventories will further advance this theoretical integration. This work is now well underway.

**FIGURE CAPTION**

**Fig. 1. Mean number of responses followed by liked interest items as a function of learning trials (in blocks of 16 trials) for $\underline{S}$s in the $\underline{LD}$ condition.**

## FOOTNOTE

[1]The authors gratefully acknowledge the technical assistance of J. Wayne Fox in the development and operation of the computer program.

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13. ABSTRACT

An experiment was conducted to test the hypothesis that interest inventory items would function as reinforcing stimuli in a visual discrimination task. When previously rated liked and disliked items from the Strong Vocational Interest Blank were differentially presented following one of two responses, subjects learned to respond to the stimulus that was followed by liked items. When indifferent items were presented following responses to one stimulus, the delivery of either liked or disliked items after responses to the other stimulus produced no systematic changes in discrimination performance. The results support the A-R-D interpretation that attitudinal stimuli (interest items) which elicit emotional responses will also serve as reinforcing stimuli when made contingent upon instrumental responses.

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